ASSOCIATION OF DIFFERENT PARAMETERS OF COMPLETE BLOOD COUNT WITH SEVERITY AND PROGNOSIS OF GUILLAIN-BARRE SYNDROME

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ABSTRACT

Objective: Guillain-barré syndrome is the most common and most severe acute paralytic neuropathy. This study is also aimed at to know that if there is any association of parameters of complete blood count and whether these can be used as a prognostic marker for guillain-barré syndrome.

Study Design: Retrospective cross-sectional.

Place and Duration of Study: Sahiwal Medical College Sahiwal, from Oct 2019 to Aug 2020.

Methodology: This retrospective cross-sectional study was conducted at Sahiwal Medical College Sahiwal, from Oct 2019 to Aug 2020 after approval from Institutional Review Board. The data was assessed by SPSS-26. Frequency distributions of study participants were calculated. Significance of the associations was assessed by Kruskal-Wallis test and one way ANOVA test. A *p*-value <0.05 was taken as statistically significant.

Results: Male were predominant among guillain-barré syndrome patients presenting at DHQ Hospital, Govt. Haji Abdul Qayyum Hospital Sahiwal and Surayya Azeem Teaching Hospital Lahore (65.2%). Most of the patients were in the mild category of guillain-barré syndrome (60.8%), 26% in moderate and 14.2% in severe category. We also calculated complete blood count of all study participants and calculated normality of data. We made two tables depending upon the normality of the data and cross tabulated them with severity of guillain-barré syndrome. The parameters with skewed distribution cross tabulated with severity of guillain-barré syndrome. Platelets counts showed highly significant results (p=0.04). Among the variables which were normally distributed, red blood cell count showed highly significant results when compared with severity of guillain-barré syndrome (p=0.02).

Conclusion: There is strong association of some parameters of complete blood count and these can also be used as prognostic markers in severity of guillain-barré syndrome though a more detailed study with larger sample size is needed.

Keywords: Complete blood count, Guillain-barré syndrome, Severity.

INTRODUCTION

Guillain-barré syndrome (GBS) is the most common and most severe acute paralytic neuropathy, with about 100,000 people developing the disorder every year worldwide[1]. Under the umbrella term of Guillain-Barré syndrome are several recognizable variants with distinct clinical and pathological features[2]. The severe, generalized manifestation of GBS with respiratory failure affects 20–30% of cases[3]. Treatment with intravenous immunoglobulin or plasma exchange is the optimal management approach, alongside supportive care. Understanding of the infectious triggers and immunological and pathological mechanisms has advanced substantially in the past 10 years, and is guiding clinical trials investigating new treatments[4]. Investigators of large, worldwide, collaborative studies of the spectrum of GBS are accruing data for clinical and biological databases to inform the development of outcome predictors and disease biomarkers. Such studies are transforming the clinical and scientific landscape of acute autoimmune neuropathies[5].

Much effort has been made to describe subgroups of patients, primarily based on cohorts of patients with severe GBS. Because the pathophysiologic mechanism is not fully elucidated, it is not known which factors determine maximal severity, course of the disease, and residual symptoms[6]. Another subgroup, patients with mild disease, comprise 5-28% of all GBS cases, and it is surprising how little information is available about this substantial group[7]. A retrospective study was done on the group of patients who remain mildly affected, i.e., able to walk independently at nadir (maximum severity). However, owing to the retrospective design, the authors were unable to study whether there were differences between patients with mild disease and those with severe disease with respect to progression, the course of the neurologic symptoms, and residual disability[8]. In addition to a better insight in the pathophysiologic mechanisms, further describing the patients with mild disease might also give information on whether this subgroup should be treated with IV

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immunoglobulins (IVIg). This is important because at present, IVIg treatment is not given routinely to patients with mild disease in most centers[9].

In our study we divided the patients of GBS into mild, moderate and severe categories on the basis of The Hughes disability scale which is used to represent the mobility. Though the data relating the association of different complete blood count parameters with severity of GBS is scarce but we made an attempt to find out if there is any. Though we use nerve conduction studies and cerebrospinal fluid analysis for diagnosis of GBS but our study is also aimed at to know that if CBC can be used as a prognostic marker for GBS.

METHODOLOGY

This retrospective cross-sectional study was conducted at Sahiwal Medical College Sahiwal, from October 2019 to August 2020 after approval from Institutional Review Board of Sahiwal Medical College Sahiwal. A validated questionnaire was filled by the patients after taking informed consent from them. Convenient sampling technique was used. Blood samples of the patients were also taken to calculate different parameters.

Sample size was calculated according to following formula:

$$Sample\ Size = \frac{Z_{1-\alpha/2}{}^2 p(1-p)}{d^2}$$

Z1-a/2= is standard normal variant (at 5% type 1 error (p<0.05) it is 1.96. As in majority of studies

p-values are considered significant below 0.05 hence 1.96 is used in formula.

p = Expected proportion in population based on previous studies or pilot studies= 0.20[7]

d = Absolute error or precision = 0.08

Sample size = 60.

Diagnosed cases of GBS by nerve conduction studies and CSF examination presenting to District Head Quarter Teaching Hospital, Government Haji Abdul Qayyum Hospital Sahiwal and Surayya Azeem teaching hospital were included in the study.

Patients diagnosed with diseases other than GBS were excluded from the study.

Convenient sampling technique was used. Blood samples of the study participants were taken and serum was separated by centrifugation. Complete blood count was done and different parameters were calculated.

The data was assessed by SPSS-26. Frequency distributions of study participants were calculated. Significance of the associations was assessed by Kruskal-Wallis test and one way ANOVA test. A p-value <0.05 was taken as statistically significant.

RESULTS

Male were predominant among GBS patients presenting at DHQ and Govt. Haji Abdul Qayyum Hospital Sahiwal (65.2%). Most of the patients were in the mild category of GBS (60.8%), 26% in moderate and 14.2% in severe category (table-I).

Table-I: Frequency distribution of demographic variables in Guillain-Barre Syndrome patients at Sahiwal (n=69).

Variables	Groups	Frequency	Percentage
Gender	Male	45	65.2
	Female	24	34.8
Severity	Mild	42	60.8
	Moderate	18	26.0
	Severe	9	14.2

We also calculated complete blood count of all study participants and calculated normality of data. We made two tables depending upon the normality of the data and cross tabulated them with severity of GBS. Table-II shows the parameters with skewed distribution cross tabulated with severity of GBS. Platelets

Table-II: Frequency distribution of non-normal distributed complete blood count variables in guillain-barre syndrome patients at Sahiwal (n=69).

Variables		Severity			*p-value
		Mild (Median ± IQR)	Moderate (Median ± IQR)	Severe (Median ± IQR)	
Complete Blood Profile	White Blood Cells	4.2± 3.7	3.6 ± 4.5	3.5 ± 4.45	0.334
	Lymphocytes	1.8 ± 1.3	1.5 ± 0.63	1.31 ±.35	0.120
	Hemoglobin	11.7 ± 1.63	10.1 ± 3.5	11.5 ± 3.4	0.723
	Mean Corpuscular Hb	24 ± 3	23.3 ±3.5	24.2 ± 3.1	0.114
	Red cell distribution width %	12.4 ± 0.12	12.6 ± 1.6	17.2 ± 11	1.235
	Platelets	234 ± 25	256 ± 33	266 ± 72	0.04
	Mean Corpuscular volume	81.2 ±4.7	79.1 ±3.5	82.6 ±11.3	0.183
	Hematocrit	39.2 ± 4.5	42.2 ± 6.7	41.5 ± 5.61	0.766

Calculated by Kruskal-Wallis Test as the variables in the table are not normally distributed

counts showed highly significant results (p=0.04).

Among the variables which were normally distributed, red blood cell count showed highly significant results when compared with severity of GBS (p=0.02 each) (table-III).

Table-III: Frequency distribution of normally distributed complete blood count variables in guillain-barre syndrome patients at Sahiwal (n=69).

Variables		Severity			*p-value
		Mild (Mean ± SD)	Moderate (Mean ± SD)	Severe (Mean ± SD)	
Complete Blood Profile	Age	23.11 ± 13.45	29.13 ± 11.40	36.45 ± 14.32	0.223
	Mean Corpuscular Hb conc.	34.2 ± 0.4	32.8 ± 0.46	29.5 ± 1.5	0.871
	Red blood cell	5.06 ± 0.67	4.6 ± 0.07	5.2 ±.66	0.02

Calculated by One Way ANOVA Test as the variables in the table are normally distributed

DISCUSSION

GBS is an acute inflammatory polyradiculoneuropathy that have distinct subtypes like acute motor axonal neuropathy (AMAN), acute inflammatory demyelinating polyneuropathy (AIDP) or acute motor and sensory axonal neuropathy (AMSAN)[8]. AIDP is the most common form of GBS and it is also called classical form[9]. Our GBS group was established from electro- physiologically verified classic cases in order to reach homogeneous results. GBS usually presents with bilateral symmetrical ascending flaccid paralysis but other unusual presentations such as cranial nerve palsy have been reported and among these, facial palsy is the most common (24- 60%)[10]. Bilateral simultaneous facial palsy is increasingly recognized as an atypical variant of GBS in adults[11]. Facial diplegia ratio has been found as 42% in our study. Ozler *et al* showed a positive correlation between NLR values and grade of facial paralysis In Bell's palsy group[12]. Our finding is similar with this study for our facial diplegia plus group. Clinical manifestations of GBS cases vary depending on the severity of the infiltrative process in inflammatory neuropathies[13]. The main pathological mechanism is macrophage infiltration and damage of the myelin sheath segment. Proximal nerve roots and intramuscular nerve sections are damaged more where the bloodnerve barrier is weaker[14]. CSF findings of GBS include that elevated protein, normal/slightly high lymphocytes. Our study showed the same finding as the lymphocyte count was higher along with the severity of GBS patients.

There are studies which report that there is higher ratio of males for GBS[15]. Similar was found in our study as most of the patients with GBS were males. Most of the cases were in mild category as in our region GBS resolves with minimum of the invasive treatment procedures. It can be attributed to strong immunity in the people of this region. Such immunity statuses can be due to the fact that the mortality rate due to recent COVID-19 infections was also quite low in this part of Pakistan than that of the others[16].

As far as the different parameters of complete blood count are concerned, most of them were found to be with in normal limits though there was increase and decrease in some of them along with the severity of GBS. Red cell distribution width and the platelets were increased with increase in severity of GBS in our study participants. White blood cell count was found to be decreased with increase in severity. A previous study by Sahin *et al*, stated the elevated Neutrophil / Lymphocyte ratio in severe cases of GBS[17]. This ratio was not calculated in our study. Mean corpuscular hemoglobin concentration was decreasing with increase in severity in our study participants. It can be due to increase in antibodies levels in plasma of such patients.

As far as the association of these CBC parameters is concerned, the results were found to be strongly associated with severity of GBS for platelet count (p=0.04) and red blood cell count (0.02). Levels of these two parameters can be used as prognostic factors in future patients of GBS but a great limitation in this regard is limited sample size. Future studies on larger sample size can be done to find out the validity of our findings.

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CONCLUSION

There is strong asso-ciation of some parameters of complete blood count and these can also be used as

prognostic markers in severity of GBS though a more detailed study with larger sample size is needed.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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